PROPOSED ACTION:	Issuance of an Incidental Harassment Authorization for Murray Street Bridge Seismic Retrofit Project in Santa Cruz, California.
TYPE OF STATEMENT:	Draft Environmental Assessment
LEAD AGENCY:	U.S. Department of Commerce National Oceanic and Atmospheric Administration National Marine Fisheries Service
RESPONSIBLE OFFICIAL:	Donna S. Wieting, Director Office of Protected Resources, National Marine Fisheries Service
FOR FURTHER INFORMATION:	Shane Guan National Marine Fisheries Service Office of Protected Resources Permits and Conservation Division 1315 East West Highway Silver Spring, MD 20910 301-427-8401
LOCATION:	Santa Cruz, California
ABSTRACT:	This Environmental Assessment analyzes the environmental impacts of the National Marine Fisheries Service, Office of Protected Resources' proposal to issue an Incidental Harassment Authorization, pursuant to section 101(a)(5)(D) of the Marine Mammal Protection Act, to the California Department of Transportation for the take of small numbers of marine mammals incidental to conducting the Murray Street Bridge Seismic Retrofit Project in Santa Cruz, California.
DATE:	October 2015

TABLE OF CONTENTS

Chapter 1 Introduction and Purpose and Need

1.1. Description of Proposed Action

The Marine Mammal Protection Act (MMPA) prohibits the incidental taking of marine mammals. The incidental take of a marine mammal falls under three categories: mortality, serious injury, or harassment, which includes injury and behavioral effects. The MMPA defines harassment as any act of pursuit, torment, or annoyance which: (1) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (2) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment). There are exceptions to the MMPA's prohibition on take, such as the authority at issue here for us to authorize the incidental taking of small numbers of marine mammals by harassment upon the request of a U.S. citizen provided we follow certain statutory and regulatory procedures and make determinations. This exception is discussed in more detail in Section 1.2.

We propose to issue an Incidental Harassment Authorization (IHA) to the California Department of Transportation (CALTRANS) under the MMPA for the taking of small numbers of marine mammals, incidental to CALTRANS' Murray Street Bridge Seismic Retrofit Project in Santa Cruz, California. We do not have the authority to permit, authorize, or prohibit CALTRANS' construction activities.

Our proposed action is a direct outcome of CALTRANS requesting an IHA under Section 101(a)(5)(D) of the MMPA to take marine mammals, by harassment, incidental to conducting the Murray Street Bridge Seismic Retrofit Project. Pile removal and pile driving activities associated with that Project have the potential to take, by harassment, marine mammals. CALTRANS therefore requires an IHA for incidental take.

Our issuance of an IHA to CALTRANS is a major federal action under the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) regulations in 40 CFR §§ 1500-1508, and NOAA Administrative Order (NAO) 216-6. Thus, we are required to analyze the effects of our proposed action.

This Draft Environmental Assessment (Draft EA), titled "*Issuance of an Incidental Harassment Authorization for Murray Street Bridge Seismic Retrofit Project, Santa Cruz, California*," (hereinafter, Draft EA) addresses the potential environmental impacts of two alternatives, namely:

- Issue the Authorization to CALTRANS under the MMPA for Level B harassment of marine mammals during CALTRANS' Murray Street Bridge Seismic Retrofit Project, taking into account the prescribed means of take, mitigation measures, and monitoring requirements required in the proposed Authorization; or

- Not issue an Authorization to CALTRANS, in which case, for the purposes of NEPA analysis only, we assume that CALTRANS would forego the proposed Murray Street Bridge Seismic Retrofit Project.

1.1.1. Background on CALTRANS' MMPA Application

On February 17, 2015, CALTRANS submitted a request to NMFS for an IHA for the possible harassment of small numbers of Pacific harbor seal (*Phoca vitulina richardii*) and California sea lion (*Zalophus californianus*) incidental to construction associated with the Murray Street Bridge Seismic Retrofit Project in the city of Santa Cruz, California, for a period of one year starting spring 2016. NMFS determined the IHA application was complete on April 2, 2015, and proposes to issue an IHA that would be valid between March 1, 2016 and February 28, 2017.

The purpose of the proposed Murray Street Bridge Seismic Retrofit Project is to replace deficient bridge barriers (widening shoulders to standard widths and replacement and improvement of sidewalks and railings). The seismic retrofit project would provide the bridge with additional vertical support and resistance to lateral seismic forces by installing additional pilings and supplemental structural elements. In order to provide sufficient area for construction operations, some boats, harbor facilities, and commercial businesses would require temporary relocation.

1.1.2. Marine Mammals in the Action Area

The proposed construction project could adversely affect the following marine mammal species under NMFS jurisdiction:

- Harbor seal (*Phoca vitulina richardii*), and
- California sea lion (*Zalophus californianus*).

1.2. Purpose and Need

The MMPA prohibits "takes" of marine mammals, with a number of specific exceptions. The applicable exception in this case is an authorization for incidental take of marine mammals in section 101(a)(5)(D) of the MMPA.

Section 101(a)(5)(D) of the MMPA directs the Secretary of Commerce (Secretary) to authorize, upon request, the incidental, but not intentional, taking of small numbers of marine mammals of a species or population stock, by United States citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if we make certain findings and provide a notice of a proposed authorization to the public for review. Entities seeking to obtain authorization for the incidental take of marine mammals under our jurisdiction must submit such a request (in the form of an application) to us.

We have issued regulations to implement the Incidental Take Authorization provisions of the MMPA (50 CFR Part 216) and have produced Office of Management and Budget (OMB)-approved application instructions (OMB Number 0648-0151) that prescribe the procedures

necessary to apply for authorizations. All applicants must comply with the regulations at 50 CFR § 216.104 and submit applications requesting incidental take according to the provisions of the MMPA.

Purpose: The primary purpose of our proposed action—the issuance of an Authorization to CALTRANS—is to authorize (pursuant to the MMPA) the take of marine mammals incidental to CALTRANS' proposed activities. The IHA, if issued, would exempt CALTRANS from the take prohibitions contained in the MMPA.

To authorize the take of small numbers of marine mammals in accordance with Section 101(a)(5)(D) of the MMPA, we must evaluate the best available scientific information to determine whether the take would have a negligible impact on marine mammals or stocks and not have an unmitigable adverse impact on the availability of affected marine mammal species for certain subsistence uses. We cannot issue an IHA if it would result in more than a negligible impact on marine mammal species or stocks or if it would result in an unmitigable adverse impact on subsistence.

In addition, we must prescribe, where applicable, the permissible methods of taking and other means of effecting the least practicable impact on the species or stocks of marine mammals and their habitat (i.e., mitigation), paying particular attention to rookeries, mating grounds, and other areas of similar significance. If appropriate, we must prescribe means of effecting the least practicable impact on the availability of the species or stocks of marine mammals for subsistence uses. Authorizations must also include requirements or conditions pertaining to the monitoring and reporting of such taking, in large part to better understand the effects of such taking on the species. Also, we must publish a notice of a proposed Authorization in the *Federal Register* for public notice and comment.

The underlying purpose of this action is therefore to determine whether the take resulting from CALTRANS's Murray Street Bridge Seismic Retrofit Project would have a negligible impact on affected marine mammal species or stocks and would not have an unmitigable adverse impact on the availability of marine mammals for taking for subsistence uses, and to develop mitigation and monitoring measures to reduce the potential impacts.

Need: CALTRANS submitted an application demonstrating both the need and potential eligibility for issuance of an IHA in connection with the activities described in section 1.1.1. We now have a corresponding duty to determine whether and how we can authorize take by Level B harassment incidental to the activities described in CALTRANS' application. Our responsibilities under section 101(a)(5)(D) of the MMPA and its implementing regulations establish and frame the need for this proposed action.

Any alternatives considered under NEPA must meet the agency's statutory and regulatory requirements. Our described purpose and need guide us in developing reasonable alternatives for

consideration, including alternative means of mitigating potential adverse effects. Thus, we are developing and analyzing alternative means of developing and issuing an Authorization, which may require the applicant to include additional mitigation and monitoring measures in order for us to make our determinations under the MMPA.

1.3. The Environmental Review Process

NEPA compliance is necessary for all "major" federal actions with the potential to significantly affect the quality of the human environment. Major federal actions include activities fully or partially funded, regulated, conducted, authorized, or approved by a federal agency. Because our issuance of an Authorization would allow for the taking of marine mammals consistent with provisions under the MMPA and incidental to the applicant's activities, we consider this as a major federal action subject to NEPA.

Under the requirements of NAO 216-6 section 6.03(f)(2)(b) for incidental harassment authorizations, we prepared this EA to determine whether the direct, indirect and cumulative impacts related to the issuance of an IHA for incidental take of marine mammals during the conduct of CALTRANS' Murray Street Bridge Seismic Retrofit Project in Santa Cruz, California, could be significant. If we deem the potential impacts to be not significant, this analysis, in combination with other analyses incorporated by reference, may support the issuance of a Finding of No Significant Impact (FONSI) for the proposed Authorization.

1.3.1. Laws, Regulations, or Other NEPA Analyses Influencing the EA's Scope

We have based the scope of the proposed action and nature of the two alternatives considered in this EA on the relevant requirements in section 101(a)(5)(D) of the MMPA. Thus, our authority under the MMPA bounds the scope of our alternatives. We conclude that this analysis—when combined with the analyses in the following documents—fully describes the impacts associated with the proposed construction project with mitigation and monitoring for marine mammals. After conducting a review of the information and analyses for sufficiency and adequacy, we incorporate by reference the relevant analyses on CALTRANS's proposed action as well as discussions of the affected environment and environmental consequences within the following documents, per 40 CFR §1502.21 and NAO 216-6 § 5.09(d):

- *Murray Street Bridge (# 36C-0108) Seismic Retrofit Project Incidental Harassment Authorization Application* (CALTRANS, 2015),
- *Murray Street Bridge (# 36C-0108) Seismic Retrofit Project Natural Environment Study* (CALTRANS, 2010a),
- *Murray Street Bridge (# 36C-0108) Seismic Retrofit Project Biological Assessment* (CALTRANS, 2010b),
- *City of Santa Cruz 2030 General Plan* (City of Santa Cruz, 2012),
- *Integrated Water Plan Program Environmental Impact Report* (EDAW, 2005).

MMPA APPLICATION AND NOTICE OF THE PROPOSED AUTHORIZATION

The CEQ regulations (40 CFR § 1502.25) encourage federal agencies to integrate NEPA's environmental review process with other environmental reviews. We rely substantially on the public process for developing proposed Authorizations and evaluating relevant environmental information and provide a meaningful opportunity for public participation as we develop corresponding EAs. We fully consider public comments received in response to our publication of the notice of proposed Authorization during the corresponding NEPA process.

We considered CALTRANS' proposed mitigation and monitoring measures and determined that they would help ensure that the Project would effect the least practicable impact on marine mammals. These measures include: (1) conducting in-water construction only during daylight hours, when visual monitoring of marine mammals can be conducted; (2) implementing a soft start for all impact and vibratory pile driving; and (3) implementing shutdown measures if a marine mammal within a zone of influence appears disturbed by the work activity. Through the MMPA process, we preliminarily determined that, provided that CALTRANS implements the required mitigation and monitoring measures, the impact of the Project on marine mammals would be, at worst, a temporary modification in behavior of small numbers of certain species of marine mammals that may be hauled out in the vicinity of the proposed activity.

We would also prepare a *Federal Register* notice on the proposed activity and request that the public submit comments, information, and suggestions concerning CALTRANS' request, the content of our proposed IHA, and potential environmental effects related to the proposed issuance of the Authorization. This EA incorporates by reference and relies on CALTRANS' application (CALTRANS, 2015).

In summary, the analyses referenced above support our conclusion that, with the incorporation of the proposed monitoring and mitigation measures, the issuance of an IHA to CALTRANS for the Murray Street Bridge Seismic Retrofit Project would not result in any significant direct, indirect, or cumulative impacts. Based on our MMPA analysis, the intermittent frequency and short duration of the harassment from the construction project would allow adequate time for the marine mammals to recover from potentially adverse effects. Furthermore, the referenced analyses concluded that additive or cumulative effects of the construction project on its own or in combination with other activities, are not expected to occur. Finally, the environmental analyses did not identify any significant environmental issues or impacts.

1.3.2. Scope of Environmental Analysis

Given the limited scope of the decision for which we are responsible (*i.e.*, issue the IHA including prescribed means of take, mitigation measures, and monitoring requirements, or not issue the IHA), this Draft EA provides more focused information on the primary issues and impacts of environmental concern related specifically to our issuance of the IHA. This Draft EA

does not further evaluate effects to the elements of the human environment listed in Table 1, because previous environmental reviews (EDAW, 2005; CALTRANS, 2010a, 2010b; City of Santa Cruz, 2012; CALTRANS, 2014) have shown that the issuance of an IHA for activities similar to CALTRANS' proposed construction project would not significantly affect those components of the human environment. Moreover, those analyses are consistent with our MMPA analysis concluding that there would be no significant impacts to marine mammals.

Table 1. Components of the human environment not affected by our issuance of an IHA.

Biological	Physical	Socioeconomic / Cultural
Amphibians	Air Quality	Commercial Fishing
Humans	Geography	Recreational Fishing
Non-Indigenous Species	Land Use	National Historic Preservation Sites
Seabirds	State Marine Protected Areas	National Trails and Nationwide Inventory of Rivers
	Park Land	Low Income Populations
	Prime Farmlands	Minority Populations
	Wetlands	Public Health and Safety
		Historic and Cultural Resources

1.3.3. Comments on This Draft EA

NAO 216-6 established NOAA procedures for complying with NEPA and the implementing NEPA regulations issued by the CEQ. Consistent with the intent of NEPA and the clear direction in NAO 216-6 to involve the public in NEPA decision-making, we are releasing this Draft EA for public comment on the potential environmental impacts of our issuance of an IHA, as well as comment on the activities described in CALTRANS' MMPA application and in the *Federal Register* notice of the proposed IHA. The CEQ regulations further encourage agencies to integrate the NEPA review process with review under other environmental statutes. Consistent with agency practice, we integrated our NEPA review and preparation of this Draft EA with the public process required by the MMPA for the proposed issuance of an IHA.

The Draft EA and *Federal Register* notice of the proposed IHA, combined with our preliminary determinations, supporting analyses, and corresponding public comment period are instrumental in providing the public with information on relevant environmental issues and offering the public a meaningful opportunity to provide comments to us for consideration in both the MMPA and NEPA decision-making processes.

1.4. Other Permits, Licenses, or Consultation Requirements

This section summarizes federal, state, and local permits, licenses, approvals, and consultation requirements necessary to implement the proposed action.

1.4.1. National Environmental Policy Act

Issuance of an Authorization is subject to environmental review under NEPA. NMFS may prepare an EA, an EIS, or determine that the action is categorically excluded from further review. While NEPA does not dictate substantive requirements for an Authorization, it requires consideration of environmental issues in federal agency planning and decision making. The procedural provisions outlining federal agency responsibilities under NEPA are provided in CEQ's implementing regulations (40 CFR §§ 1500-1508).

1.4.2. Marine Mammal Protection Act

The MMPA and its provisions that pertain to the proposed action are discussed above in section 1.2.

1.4.3. Endangered Species Act (ESA)

No ESA-listed marine mammal species under NMFS jurisdiction occurs in the vicinity of CALTRANS' proposed construction projects.

1.4.4. Magnuson-Stevens Fishery Conservation and Management Act

Under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), Federal agencies are required to consult with the Secretary of Commerce with respect to any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such agency which may adversely affect essential fish habitat (EFH) identified under the MSFCMA. Although the Monterey Bay contains the coastal groundfish and coastal pelagic EFHs, the proposed CALTRANS Murray Street Bridge construction work would be confined within the Santa Cruz Harbor. Therefore, NMFS considers that CALTRANS proposed construction activity would not affects these EFHs.

Chapter 2 Alternatives

2.1. Introduction

NEPA and the CEQ implementing regulations (40 CFR §§ 1500-1508) require consideration of alternatives to proposed major federal actions and NAO 216-6 provides NOAA policy and guidance on the consideration of alternatives to our proposed action. An EA must consider all reasonable alternatives, including the Preferred Alternative. It must also consider the No Action Alternative, even if it that alternative does not meet the stated purpose and need. This provides a baseline analysis against which we can compare the other alternatives.

To warrant detailed evaluation as a reasonable alternative, an alternative must meet our purpose and need. In this case, as we previously explained in Chapter 1 of this EA, an alternative only meets the purpose and need if it satisfies the requirements under section 101(a)(5)(D) the MMPA. We evaluated each potential alternative against these criteria; identified one action alternative along with the No Action Alternative; and carried these forward for evaluation in this draft EA. This chapter describes the alternatives and compares them in terms of their environmental impacts and their achievement of objectives.

As described in Section 1.2, the MMPA requires that we must prescribe the means of effecting the least practicable impact on the species or stocks of marine mammals and their habitat. In order to do so, we must consider CALTRANS' proposed mitigation measures, as well as other potential measures, and assess how such measures could benefit the affected species or stocks and their habitat. Our evaluation of potential measures includes consideration of the following factors in relation to one another: (1) the manner in which, and the degree to which, we expect the successful implementation of the measure to minimize adverse impacts to marine mammals; (2) the proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and (3) the practicability of the measure for applicant implementation.

Any additional mitigation measure proposed by us beyond what the applicant proposes should be able to or have a reasonable likelihood of accomplishing or contributing to the accomplishment of one or more of the following goals:

- Avoidance or minimization of marine mammal injury, serious injury, or death, wherever possible;
- A reduction in the numbers of marine mammals taken (total number or number at biologically important time or location);
- A reduction in the number of times the activity takes individual marine mammals (total number or number at biologically important time or location);
- A reduction in the intensity of the anticipated takes (either total number or number at biologically important time or location);

- Avoidance or minimization of adverse effects to marine mammal habitat, paying special attention to the food base; activities that block or limit passage to or from biologically important areas; permanent destruction of habitat; or temporary destruction/disturbance of habitat during a biologically important time; and
- For monitoring directly related to mitigation, an increase in the probability of detecting marine mammals, thus allowing for more effective implementation of the mitigation.

Alternative 1 (the Preferred Alternative) includes a suite of mitigation measures intended to minimize potentially adverse interactions with marine mammals.

2.2. Description of CALTRANS's Proposed Activities

CALTRANS proposes to conduct Murray Street Bridge Seismic Retrofit Project at Santa Cruz, California (Figure 1).

The proposed project consists of a seismic retrofit of the existing Murray Street Bridge, which spans the Santa Cruz Small Craft Harbor and additional minor modifications to replace deficient bridge barriers. The seismic retrofit project would provide the bridge with additional vertical support and resistance to lateral seismic forces by installing additional pilings and supplemental structural elements. In order to provide sufficient area for construction operations, some boats, Harbor facilities, and commercial businesses would require temporary relocation.

The nine-span bridge is supported by two abutments (identified as Abutments 1 and 10, located at the western and eastern ends of the bridge, respectively) and 8 "bents" (identified as Bents 2 through 9, located at 60-foot intervals between the abutments). The seismic retrofit project consists of the following basic elements:

(1) Installation of concrete infill walls at Bents 2, 3, 4, and 9 to span the voids between the existing concrete support columns. The infill walls would also span the void between the existing and new columns at Bent 9.

(2) Installation of shear keys and seat extenders at Abutments 1 and 10 and Bents 2 through 9.

(3) Retrofit of foundations with 16-inch diameter CISS (cast-in-steel-shell) piles at Bent 9 and Abutments 1 and 10. These piles would extend to depths of approximately –55 feet to –90 feet at Bent 9 and to depths of approximately -30 feet to -55 feet at Abutment 10.

(4) Retrofit abutment with two 96-inch CIDH piles (cast-in-drilled-hole) piles behind Abutment 10 to a depth of -50 feet.

(5) Retrofit of both outriggers and bents with 30-inch diameter CISS piles at Bents 6, 7, and 8 and 30-inch diameter CIDH piles at Bents 2, 3, 4, and 5. These piles would extend to depths of approximately -55 feet to -85 feet at Bent 5 and at approximately -85 feet to -120 feet at Bents 6-8.

(6) Installation of fenders to protect boats passing by the pier foundations, new pile caps at Bents, 5, 6, 7, and 8, and replacement of existing fender.

Figure 1. Location of CALTRANS proposed Murray Street Bridge Seismic Retrofit Project in Santa Cruz, California

In addition, 35 14-inch concrete piles would be removed at Docks FF and T to accommodate project construction with reinstallation upon completion of construction. If a temporary trestle is constructed to facilitate installation of the permanent bridge piles, it is estimated that 120 12-inch steel piles or 72 20-inch steel piles would be installed and removed upon completion of construction.

In-Water Construction Activities

The construction schedule would include 10 months of potential in-water construction activity over 2 years – 5 months during the first year and 5 months during the second year. Activities include: removal of docks to accommodate construction access; potential installation of piles for a construction trestle from the bridge; pile driving; transport of materials; and replacement of harbor docks upon completion of the bridge seismic retrofit project. In-water activities would be intermittent throughout the 5-month periods, but it is conservatively assumed that some activity could occur daily throughout these periods.

- Installation of Bridge Piles: The most intense activity would be the installation of new bridge support piles, which would also involve the demolition of the existing piles at Bent 6. CISS piles at Bents 5 through 8 would be installed within the waterway by driving 30-inch steel casings either to refusal at rock or into a shaft drilled within rock (depending on the location). The installation of new piles at Bents 5 through 8 would include two piles on each side for a total of 16 piles in the water (and 10 additional piles at Bents 4 and 9 that are partially in the water). The work activity would be focused within the area of the bridge. Overall the installation of piles is expected to take a total of approximately 1 day for each 30-inch pile and 4 days for 8 16-inch piles for a total of 30 days. The installation of these piles requires the use of a crane(s), a drilling rig, a pile driver, excavation and earthmoving equipment, concrete trucks and pumps, concrete vibrators, supply trucks, welding equipment, and other machinery. Based on the geotechnical site characteristics, permanent bridge piles would be partially or entirely vibrated into the Harbor substrate rather than driving them entirely by means of "hammering". A vibratory hammer would be used to start driving all sheet piles, but an impact hammer may be required to complete driving depending on the density of subsurface materials.

- Installation of In-Water Barge or Temporary Bridge Trestle: Installation of an in-water barge or temporary bridge trestle is planned to accommodate equipment for pile installation. Work within the waterway would require either the use of barges or construction of trestles to provide work platforms. If barges are utilized, prefabricated modular units may be brought to the site and locked together. This type of platform can be installed, reconfigured, and removed relatively quickly, but the system is not suitable for areas that are too narrow to accommodate the modules. For example, footings from the Union Pacific Railroad Bridge to the north and footings from the Murray Street Bridge appear too close together to allow use of a modular barge between footings. In these areas, a trestle likely would need to be constructed.

- Removal and Replacement of Boat Berths: The temporary use of portions of the eastern harbor boat yard and the western parking lot for contractor staging, in combination with provision of construction access to the bridge from the waterway, would result in temporary disruptions of harbor activities including temporary removal of existing boat berths and replacement upon completion of the project. To accommodate construction staging and in-water construction, the project calls for the temporary relocation of berths

at Dock FF and Dock BY (Boat Yard on east side) to existing visitor berths with reconstruction of Dock FF and Dock BY upon completion of the bridge seismic retrofit construction. Dock FF accommodates University of California Santa Cruz (UCSC) boats that are used for university classes. A walking dock (gangway) would be constructed to connect the existing parking lot area to the portion of Dock FF that would remain during construction. Six temporary berths may be constructed adjacent to the gangway to minimize relocation of some of the existing boats. Upon completion of construction, no additional new boat berths would be constructed as was originally proposed. Although design plans have not yet been completed for the reinstalled berths, it is expected that the berth docks would be plastic, wood or concrete over polyethylene floats and would be anchored with pilings. Piles would be driven into the harbor floor by mechanical hammer. There would be no dredging or placement of fill in harbor waters with reinstallation of docks and both berths.

Land Construction Activities

The proposed project includes the other construction activities that are located on land as follows:

- Demolition: Demolition activities include the removal of pilings at Bent 6, temporary removal of the gangway under Bent 4, the removal of existing sidewalks and railings along the entire length of the bridge, and the removal of pavement at both ends of the bridge. Equipment for demolition activities includes cranes, excavators, front-end loaders, dump trucks, concrete saws, and jackhammers.

- Pile and Anchor Installation Outside Waterway: The CISS piles at Abutment 1, Bent 9 and Abutment 10 would be installed by driving 16-inch steel casing to depths of approximately -30 to -90 feet and filling them with concrete. The 96-inch diameter anchor pile for Abutment 10 would require excavation and installation of a temporary steel casing, which would be filled with concrete. The 30-inch CIDH piles at Bents 2-4 would be installed by first driving 30-inch steel casing to depths of approximately -70 to -90 feet and filling them with concrete. The anchor pile excavation would be dewatered by pumping, if necessary. The installation of these piles would require the use of excavation equipment, soil tamper equipment, and the other construction equipment described above for installing piles within the waterway.

- Bridge Construction: The project includes installation of new girders on the southern edge of the bridge, the installation of a cantilevered extension along the northern edge of the bridge, and the construction of barrier railings as well as the installation and construction of various project features below the bridge road surface and above the piles. Equipment required for this part of the project would include a crane, concrete trucks and pumps, supply trucks, welding equipment, and other machinery.

- Roadway Approach Construction: Excavation of existing road approaches up to 200 feet from each end of the bridge would be performed. Gravel base and asphalt concrete would be placed to match the new widened bridge deck. Equipment used would be

typical paving equipment including graders, loaders, bulldozers, rollers, dump trucks, and a paving machine. Metal beam guard railings would be placed at each corner of the bridge.

- Construction of Temporary Trestle: Construction of a trestle could vary depending on materials available to contractors. One possible trestle configuration would be 60-foot long steel girders over the Harbor navigation channel. The spans would be supported on falsework bents, perhaps constructed of steel piles which are a fairly common falsework material. Piles would be driven in the water by a crane sitting over the land. Preliminary estimates by the project engineer indicate that up to 120 12-inch steel beams would be required for a trestle spanning the bridge; vibratory drivers would be used. Approximately 6-8 of these small size piles could be installed per day. All piles would be removed at the end of construction. The trestle could be made of "Bailey Bridge" panels that can be used to provide bents or towers. The deck might be made of heavy timbers or open-grid panels with a safety railing to keep people and materials on the deck.

- Contractor Staging: Contractor staging activities for Phases 1 and 2 of the project would take place in an approximately 8,000 square-foot portion of an existing boat yard near the eastern edge of the bridge. Contractor staging activities for Phases 3, 4, and 5 of the project would take place in the northern portion (approximately 11,000 square feet) of a parking lot situated at the western edge of the bridge. This staging area would be used through the end of Stage 5, when original facilities would be restored.

- Temporary Harbor Facility Relocation: The temporary use of portions of the eastern harbor boat yard and the western parking lot for contractor staging as described above, in combination with provision of construction access to the bridge from the waterway, would result in temporary removal, relocation and replacement of some Harbor facilities, including temporary relocation of boats in the on-land boat yard on the east side of the Harbor that would be temporarily relocated to boat storage for approximately four months. On the west side, 60 rowing boats stored under the existing Murray Street bridge would be temporarily relocated to an on-land dry boat storage facility near docks A and B, and an additional 200+ square feet of storage area would be constructed to accommodate the temporary row boat storage. Row boats stored under Span 2 and UCSC Rowing Facility boats under Span 1 would be temporarily relocated to the US Coast Guard parking lot and fenced. Uses at existing offices, bathroom facilities, and storage areas located north of the western staging area (and within the City's right-of-way) would be displaced during Phases 3, 4, and 5 of the project. The buildings would be protected during construction, and a temporary 600-square-foot facility (modular) would be installed on the US Coast Guard parking area for a period of approximately six months, which would temporarily house these businesses.

Project Dates and Duration

The Murray Street Bridge Retrofit project is currently planned to commence in the spring of 2016. The Murray Street Bridge Retrofit project is tentatively proposed for construction in five

partially overlapping interchangeable phases. Generally, work would begin on the eastern side of the Harbor and progress to the western side. The timing of each phase and a brief description of work to be performed during each phase is provided in Table 2.

Table 2. Timing of each phase of the work to be performed for the Murray Street Bridge Seismic Retrofit Project

	Location	Number	Pile Type
In-water			
Removal-Bridge	Bridge Bent 6	4	14-inch P/C concrete
Total in-water removal		*4*	
Install new permanent bridge piles	Bridge Bent 5	4	30-inch CIDH
	Bridge Bent 6 – 8	12	30-inch CISS
	Bridge Bent 9	8	16-inch CISS
Total in-water bridge pile installation		*24*	
On Land			
Install new permanent	Bridge Bent 2 – 4	6	30-inch CIDH
	Abutments 1 & 10	10	16-inch CISS
	Abutment 10	2	96-inch CIDH
Total on-land bridge pile installation		*18*	

Overall, the seismic retrofit work would be executed over a period of approximately 18 months within four construction phases as described in Table 2. The additional bridge improvements would be constructed over a period of approximately 6 months as part of Phase 5 of the construction.

In-water activity would occur in Phases 2 and 4 over an approximate total 10-month period over two years with 5 months during the first year and 5 months during the second year. However, the phases may overlap. Work tasks would vary throughout the phase. The in-water pile driving for the bridge piles would occur over a total of 30 days within this period.

Due to in-water work timing restrictions to protect federally-listed salmonids, all in-water construction activities including pile removal/installation would occur between the period from July 1 to mid-November.

2.3. Description of Alternatives

2.3.1. Alternative 1 – Issuance of an Authorization with Mitigation Measures

The proposed action constitutes Alternative 1 and is the Preferred Alternative. Under this alternative, we would issue IHAs to CALTRANS allowing the incidental take, by Level B harassment, of Pacific harbor seal and California sea lion, subject to the mandatory mitigation and monitoring measures and reporting requirements set forth in the proposed IHAs, if issued, along with any additions based on consideration of public comments.

PROPOSED MITIGATION MEASURES

For CALTRANS's proposed Murray Street Bridge Seismic Retrofit Project, CALTRANS worked with NMFS and proposed the following mitigation measures to minimize the potential impacts to marine mammals in the Project vicinity. The primary purposes of these mitigation measures are to minimize sound levels from the activities, to monitor marine mammals within designated zones of influence corresponding to NMFS' current Level B harassment thresholds and, if marine mammals with the ZOI appear disturbed by the work activity, to initiate immediate shutdown or power down of the piling hammer, making it very unlikely potential injury or TTS to marine mammals would occur and ensuring that Level B behavioral harassment of marine mammals would be reduced to the lowest level practicable.

Time Restriction

Work would occur only during daylight hours, when visual monitoring of marine mammals can be conducted. In addition, all in-water construction would be limited to the period between July 1 and November 15.

Pre-Construction Removal of Artificial Haul-out Sites.

All known and potential artificial structures could be used by pinnipeds for haul-out that occur in the construction work area would be removed, preferably to a near-by location outside of the work area prior to construction. These structures could include floating docks (i.e. Dock FF), rubber docks, or boats, such as those used by UCSC.

Pre-Construction Workers Training

Prior to in-water construction, the approved monitor would conduct a workers training to instruct construction crews regarding the status and sensitivity of the target species in the area and the actions to be taken to avoid or minimize impacts in the event of a target species entering the in-water work area.

Establish Exclusion Zones

A 10-m (33 ft) radius around the piling site should be established as an exclusion zone. The commencement of pile driving activities should be delayed if marine mammals are present

within the exclusion zone. This exclusion zone is based on received sound levels exceed 18=90 dB re 1 µPa from impact pile driving. There would be no exclusion zone for vibratory pile driving. Each day prior to the start of pile-driving, the PSO would survey the exclusion zone for marine mammals. If a pinniped is detected, impact pile driving would be delayed until the marine pinniped(s) has moved beyond the exclusion zone, verified by visual confirmation or lack of visual sighting within the next 15 minutes of the last sighting, to assume that the animal has moved beyond the exclusion zone.

Establishment of Level B Harassment Zones of Influence

A 1,000-m (0.62-mi) radius around the piling site should be established as a preliminary zone of influence (ZOI) for impact pile driving. The distance to the edge of the ZOI correspond to received level falls to 160 dB re 1 µPa from impact pile driving. The preliminary ZOI would be adjusted based on a measurement of the distance to the 160 dB isopleth. CALTRANS stated that it would not be able to monitor beyond several km for marine mammal takes. Therefore, if underwater acoustic monitoring shows that the 120 dB isopleth for vibratory pile driving is beyond 1,000 m, CALTRANS would not use vibratory pile driving for this project. A summary of modeled exclusion zone and ZOI radii based on CALTRANS (2012) is listed in Table 3.

Table 3. Modeled exclusion zone and ZOI distances to from pile driving activities for CALTRANS' Murray Street Bridge seismic retrofit project

Pile Type/Method	Source Level (dB_{rms} re 1 µPa at 10m)	Exclusion Zone (m) for pinnipeds (190 dB re 1 µPa)	ZOI (m) for impact hammer (160 dB re 1 µPa)	ZOI (m) for vibratory hammer (120 dB re 1 µPa)
14-inch P/C concrete vibratory removal (use 12-inch steel H pile as proxy)	150	NA	NA	1,000
16-inch CISS impact pile driving	187	10	631	NA
16-inch CISS vibratory pile driving (using 24-inch steel pile as proxy)	160	NA	NA	4,642
30-inch CISS or CIDH impact pile driving	190	10	1,000	NA
30-inch CISS or CIDH vibratory pile driving (use 36-inch steel pile as proxy)	170	NA	NA	21,544

Soft Start

CALTRANS would implement "soft start" (or ramp up) to reduce potential startling behavioral responses from marine mammals. Soft start requires contractors to initiate noise from the vibratory hammer for 15 seconds at reduced energy followed by a 1-minute waiting period. The

procedure would be repeated two additional times. Soft start for impact hammers requires contractors to provide an initial set of three strikes from the impact hammer at 40 percent energy, followed by a 1-minute waiting period, then two subsequent three-strike sets. Each day, CALTRANS would use the soft-start technique at the beginning of pile driving, or if pile driving has ceased for more than one hour.

Shutdown Measures

CALTRANS shall implement shutdown measures if a marine mammal is sighted approaching the Level A exclusion zone. In-water construction activities shall be suspended until the marine mammal is sighted moving away from the exclusion zone, or if the animal is not sighted for 30 minutes after the shutdown.

In addition, CALTRANS shall implement shutdown measures if the number of any allotted marine mammal takes reaches the limit under the IHA (if issued), if such marine mammals are sighted within the vicinity of the project area and are approaching the Level B ZOI during in-water pile driving.

Furthermore, CALTRANS shall implement implant shutdown measures if any marine mammals not authorized under the IHA (if issued) are sighted within the vicinity of the project area and are approaching the Level B ZOI during in-water pile driving.

PROPOSED MONITORING AND REPORTING MEASURES

Proposed Monitoring Measures

CALTRANS shall employee NMFS-approved protected species observers (PSOs) to conduct marine mammal monitoring for its Murray Street Bridge seismic retrofit project. The PSOs would observe and collect data on marine mammals in and around the project area for 30 minutes before, during, and for 30 minutes after all pile removal and pile installation work. If a PSO observes a marine mammal approaches the exclusion zone, in-water impact pile driving should be ceased immediately. In addition, if a PSO observes within a ZOI that appears to be disturbed by the work activity, the PSO would notify the work crew to initiate shutdown measures.

Monitoring of marine mammals around the construction site shall be conducted using high-quality binoculars (e.g., Zeiss, 10 x 42 power). The PSO(s) should be deployed in locations with the best vantage point where the entire ZOI can be monitored.

Data collection during marine mammal monitoring would consist of a count of all marine mammals by species, a description of behavior (if possible), location, direction of movement, type of construction that is occurring, time that pile replacement work begins and ends, any acoustic or visual disturbance, and time of the observation. Environmental conditions such as weather, visibility, temperature, tide level, current, and sea state would also be recorded.

Proposed Reporting Measures

CALTRANS would be required to submit a final monitoring report within 90 days after completion of the construction work or the expiration of the IHA (if issued), whichever comes earlier. This report would detail the monitoring protocol, summarize the data recorded during monitoring, and estimate the number of marine mammals that may have been harassed. NMFS would have an opportunity to provide comments on the report, and if NMFS has comments, CALTRANS would address the comments and submit a final report to NMFS within 30 days.

In addition, NMFS would require CALTRANS to notify NMFS' Office of Protected Resources and NMFS' Stranding Network within 48 hours of sighting an injured or dead marine mammal in the vicinity of the construction site. CALTRANS shall provide NMFS with the species or description of the animal(s), the condition of the animal(s) (including carcass condition, if the animal is dead), location, time of first discovery, observed behaviors (if alive), and photo or video (if available).

In the event that CALTRANS finds an injured or dead marine mammal that is not in the vicinity of the construction area, CALTRANS would report the same information as listed above to NMFS as soon as operationally feasible.

2.3.2. Alternative 2 – No Action Alternative

We are required to evaluate the No Action Alternative per CEQ NEPA regulations. The No Action Alternative serves as a baseline to compare the impacts of the Preferred and other Alternatives. Under the No Action alternative, we would not issue an IHA to CALTRANS for the proposed construction project.

Under the No Action Alternative, CALTRANS could choose not to proceed with their proposed activities or to proceed without an IHA. If they choose the latter, CALTRANS would not be exempt from the MMPA prohibitions against the take of marine mammals and would be in violation of the MMPA if take of marine mammals occurs.

For purposes of this draft EA, we characterize the No Action Alternative as CALTRANS not receiving an IHA and CALTRANS would not conduct construction activities for its proposed Murray Street Bridge seismic retrofit project.

2.4. Alternatives Considered but Eliminated from Further Consideration

NMFS considered whether other alternatives could meet the purpose and need and support CALTRANS's proposed construction project. An alternative that would allow for the issuance of an IHA with no required mitigation or monitoring was considered but eliminated from consideration, as it would not be in compliance with the MMPA and therefore would not meet the purpose and need. For that reason, this alternative is not analyzed further in this document. No other alternatives that would meet the purpose and need of the Project were identified.

Chapter 3 Affected Environment

This chapter describes existing conditions in the proposed action areas. Complete descriptions of the physical, biological, and social environment of the action area are contained in the documents listed in Section 1.3.1 of this EA. We incorporate those descriptions by reference from Chapters 3 and 4 of the City of Santa Cruz 2030 General Plan (City of Santa Cruz, 2012), Chapter 5 of the Integrated Water Plan Program Environmental Impact Report (EDAW, 2005), and briefly summarize or supplement the relevant sections for marine mammals in the following subchapters.

3.1. Physical Environment

3.1.1. Natural Environment

The proposed project is located at the eastern edge of the City of Santa Cruz in the County of Santa Cruz (Figure 1). The project area includes the Murray Street Bridge which spans the Santa Cruz Harbor, portions of lands within the Santa Cruz Port District harbor area, portions of the harbor waters, and the area along the Murray Street road right-of-way, west of Lake Avenue. The Geographic Position System (GPS) coordinates of the proposed work area are: 36°58'04"N, 122°00'10".

3.1.2. Essential Fish Habitat

The proposed CALTRANS Murray Street Bridge construction work would be confined within the Santa Cruz Harbor. Therefore, NMFS considers that CALTRANS proposed construction activity would not affects these EFHs.

3.2. Biological Environment

The primary component of the biological environment that would be impacted by the proposed action and alternatives would be marine mammals, which would be directly impacted by the authorization of incidental take. We briefly summarize this component of the biological environment here.

3.2.1. Marine Mammals

The marine mammal species under NMFS jurisdiction most likely to occur in the proposed construction area are Pacific harbor seal (*Phoca vitulina richardsi*) and California sea lion (*Zalophus californianus*). None of these species is listed under the Endangered Species Act (ESA).

General information on the marine mammal species found in California coastal waters can be found in Caretta *et al*. (2015), which is available at the following URL: http://www.nmfs.noaa.gov/pr/sars/pdf/pacific_sars_2014_final_noaa_swfsc_tm_549.pdf. Refer to that document for information on these species. A list of marine mammals in the vicinity of the action and their status are provided in Table 4. Specific information concerning these species

in the vicinity of the proposed action area is provided in detail in the CALTRANS's IHA application (CALTRANS 2015), please refer to that document for detailed information.

Table 4. Marine Mammal Species Potentially Present in Region of Activity

Species	ESA Status	MMPA Status	Occurrence
Harbor Seal	Not listed	Non-depleted	Frequent
California Sea Lion	Not listed	Non-depleted	Frequent

3.3. Social Environment

Authorization of the proposed Murray Street Bridge construction project could result in a low level of economic benefit to construction companies performing the work. However, such impacts would likely be negligible and on a regional or local level. Because our proposed action and alternatives relate only to the authorization of incidental take of marine mammals, the components of the social environment are not relevant to our proposed action (see subchapter 1.3.2 - Scope of Environmental Analysis). Therefore, no further analysis of the social environment is required here.

Chapter 4 Environmental Consequences

This chapter of the EA analyzes the impacts of the two alternatives and addresses the potential direct, indirect, and cumulative impacts of our issuance of an IHA. CALTRANS's application and other related environmental analyses identified previously facilitate this analysis.

Under the MMPA, we have evaluated the potential impacts of CALTRANS's construction program activities in order to determine whether to authorize incidental take of marine mammals. Under NEPA, we have determined that an EA is appropriate to evaluate the potential significance of environmental impacts resulting from the issuance of an IHA.

4.1. Effects of Alternative 1 – Issuance of an IHA with Mitigation Measures

Alternative 1 is the Preferred Alternative, under which we would issue an IHA to CALTRANS allowing the incidental take, by Level B harassment, of two species of marine mammals from March 1, 2016, through February 28, 2017, subject to the mandatory mitigation and monitoring measures and reporting requirements set forth in the IHA, if issued. We would incorporate the mitigation and monitoring measures and reporting described earlier in this EA into a final IHA.

4.1.1. Impacts to Marine Mammal Habitat

No permanent impacts to marine mammal habitat are proposed to or would occur as a result of the proposed Project. The CALTRANS's proposed Murray Street Bridge seismic retrofit project would not modify the existing habitat. Therefore, no restoration of the habitat would be necessary. A temporary, small-scale loss of foraging habitat may occur for marine mammals, if the marine mammals leave the area during pile extraction and driving activities.

Acoustic energy created during pile replacement work would have the potential to disturb fish within the vicinity of the pile replacement work. As a result, the affected area could temporarily lose foraging value to marine mammals. During pile driving, high noise levels may exclude fish from the vicinity of the pile driving. Hastings and Popper (2005) identified several studies that suggest fish would relocate to avoid areas of damaging noise energy. The acoustic frequency and intensity ranges that have been shown to negatively impact fish (FHWG 2008) and an analysis of the potential noise output of the proposed Project indicate that Project noise has the potential to cause temporary hearing loss in fish over a distance of approximately 42 meters from pile driving activity. If fish leave the area of disturbance, pinniped foraging habitat in that area may have temporarily decreased foraging value when piles are driven using impact hammering.

The duration of fish avoidance of this area after pile driving stops is unknown. However, the affected area represents an extremely small portion of the total foraging range of marine mammals that may be present in and around the project area.

Because of the short duration of the activities and the relatively small area of the habitat that may be affected, the impacts to marine mammals and the food sources that they utilize are not

expected to cause significant or long-term consequences for individual marine mammals or marine mammal populations.

4.1.2. Impacts to Marine Mammals

We expect that behavioral disturbance or displacement resulting from the activities associated with the Project have the potential to impact marine mammals. The majority of impacts are likely to occur from pile driving and pile removal activities. Pile driving and removal activities associated with the construction could cause pinniped behavioral modification and temporary displacement within the vicinity of the action area through: (1) noise generated from pile removal and pile driving; and (2) visual disturbance from construction activities and crew. These activities are not anticipated to result in injury, serious injury, or mortality of any marine mammal species and none is proposed to be authorized.

4.1.2.1.Acoustic Impacts

When considering the influence of various kinds of sound on the marine environment, it is necessary to understand that different kinds of marine life are sensitive to different frequencies of sound. Based on available behavioral data, audiograms have been derived using auditory evoked potentials, anatomical modeling, and other data, Southall et al. (2007) designate "functional hearing groups" for marine mammals and estimate the lower and upper frequencies of functional hearing of the groups. The functional groups and the associated frequencies are indicated below (though animals are less sensitive to sounds at the outer edge of their functional range and most sensitive to sounds of frequencies within a smaller range somewhere in the middle of their functional hearing range):

- Low frequency cetaceans (13 species of mysticetes): functional hearing is estimated to occur between approximately 7 Hz and 25 kHz;
- Mid-frequency cetaceans (32 species of dolphins, six species of larger toothed whales, and 19 species of beaked and bottlenose whales): functional hearing is estimated to occur between approximately 150 Hz and 160 kHz;
- High frequency cetaceans (eight species of true porpoises, six species of river dolphins, *Kogia*, the franciscana, and four species of cephalorhynchids): functional hearing is estimated to occur between approximately 200 Hz and 180 kHz; and
- Pinnipeds in Water: functional hearing is estimated to occur between approximately 75 Hz and 75 kHz, with the greatest sensitivity between approximately 700 Hz and 20 kHz.

As mentioned previously in this document, two marine mammal species are likely to occur in the proposed seismic survey area. CALTRANS and NMFS determined that in-water pile removal and pile driving during the Murray Street Bridge seismic retrofit project has the potential to

result in behavioral harassment of the marine mammal species and stocks in the vicinity of the proposed activity.

Marine mammals exposed to high-intensity sound repeatedly or for prolonged periods can experience hearing threshold shift (TS), which is the loss of hearing sensitivity at certain frequency ranges (Kastak et al. 1999; Schlundt et al. 2000; Finneran et al. 2002; 2005). TS can be permanent (PTS), in which case the loss of hearing sensitivity is unrecoverable, or temporary (TTS), in which case the animal's hearing threshold would recover over time (Southall et al. 2007). Since marine mammals depend on acoustic cues for vital biological functions, such as orientation, communication, finding prey, and avoiding predators, hearing impairment could result in the reduced ability of marine mammals to detect or interpret important sounds. Repeated noise exposure that causes TTS could lead to PTS.

Experiments on a bottlenose dolphin (*Tursiops truncates*) and beluga whale (*Delphinapterus leucas*) showed that exposure to a single watergun impulse at a received level of 207 kPa (or 30 psi) peak-to-peak (p-p), which is equivalent to 228 dB (p-p) re 1 μPa, resulted in a 7 and 6 dB TTS in the beluga whale at 0.4 and 30 kHz, respectively. Thresholds returned to within 2 dB of the pre-exposure level within 4 minutes of the exposure (Finneran *et al*. 2002). No TTS was observed in the bottlenose dolphin. Although the source level of one hammer strike for pile driving is expected to be much lower than the single watergun impulse cited here, animals being exposed for a prolonged period to repeated hammer strikes could receive more noise exposure in terms of sound exposure level (SEL) than from the single watergun impulse (estimated at 188 dB re 1 μPa2-s) in the aforementioned experiment (Finneran *et al*. 2002).

Chronic exposure to excessive, though not high-intensity, noise could cause masking at particular frequencies for marine mammals that utilize sound for vital biological functions (Clark *et al*. 2009). Masking is the obscuring of sounds of interest by other sounds, often at similar frequencies. Masking generally occurs when sounds in the environment are louder than, and of a similar frequency as, auditory signals an animal is trying to receive. Masking can interfere with detection of acoustic signals, such as communication calls, echolocation sounds, and environmental sounds important to marine mammals. Therefore, under certain circumstances, marine mammals whose acoustical sensors or environment are being severely masked could also be impaired.

Masking occurs at the frequency band which the animals utilize. Since noise generated from in-water vibratory pile removal and driving is mostly concentrated at low frequency ranges, it may have little effect on high-frequency echolocation sounds by odontocetes (toothed whales), which may hunt California sea lion and harbor seal. However, the lower frequency man-made noises are more likely to affect the detection of communication calls and other potentially important natural sounds, such as surf and prey noise. The noises may also affect communication signals when those signals occur near the noise band, and thus reduce the communication space of

animals (e.g., Clark *et al*. 2009) and cause increased stress levels (e.g., Foote *et al*. 2004; Holt *et al.* 2009).

Unlike TS, masking can potentially impact the species at community, population, or even ecosystem levels, as well as individual levels. Masking affects both senders and receivers of the signals and could have long-term chronic effects on marine mammal species and populations. Recent science suggests that low frequency ambient sound levels in the world's oceans have increased by as much as 20 dB (more than 3 times, in terms of SPL) from pre-industrial periods, and most of these increases are from distant shipping (Hildebrand 2009). All anthropogenic noise sources, such as those from vessel traffic and pile removal and driving, contribute to the elevated ambient noise levels, thus intensifying masking.

Nevertheless, the sum of noise from CALTRANS's proposed Murray Street Bridge seismic retrofit project construction activities is confined to a limited area by surrounding landmasses; therefore, the noise generated is not expected to contribute to increased ocean ambient noise. In addition, due to shallow water depths in the project area, underwater sound propagation of low-frequency sound (which is the major noise source from pile driving) is expected to be poor.

Finally, in addition to TS and masking, exposure of marine mammals to certain sounds could lead to behavioral disturbance (Richardson *et al*. 1995), such as: changing durations of surfacing and dives, number of blows per surfacing, or moving direction and/or speed; reduced/increased vocal activities; changing/cessation of certain behavioral activities, such as socializing or feeding; visible startle response or aggressive behavior, such as tail/fluke slapping or jaw clapping; avoidance of areas where noise sources are located; and/or flight responses (e.g., pinnipeds flushing into water from haulouts or rookeries).

The biological significance of many of these behavioral disturbances is difficult to predict, especially if the detected disturbances appear minor. However, the consequences of behavioral modification could be expected to be biologically significant if the change affects growth, survival, or reproduction. Some of these types of significant behavioral modifications include:

- Drastic change in diving/surfacing patterns (such as those thought to be causing beaked whale strandings due to exposure to military mid-frequency tactical sonar);
- Habitat abandonment due to loss of desirable acoustic environment; and
- Cessation of feeding or social interaction.

The onset of behavioral disturbance from anthropogenic noise depends on both external factors (characteristics of noise sources and their paths) and the receiving animals (hearing, motivation, experience, demography), and is therefore difficult to predict (Southall et al. 2007).

The proposed project area is not a prime habitat for marine mammals, nor is it considered an area frequented by marine mammals. Therefore, behavioral disturbances that could result from

anthropogenic noise associated with CALTRANS's construction activities are expected to affect only a small number of marine mammals on an infrequent and limited basis.

4.1.2.2.Visual Disturbance

The activities of workers in the project area may also cause behavioral reactions by marine mammals, such as pinnipeds flushing from the jetty or pier or moving farther from the disturbance to forage. However, the proposed construction area is confined within the Santa Cruz harbor and there is no natural pinniped haulouts. California sea lions have been observed hauled out on piers, nevertheless, they are habituated to human presence. Furthermore, pinnipeds hauled out on these structures are not in large groups due to the space limitation of these structures. Therefore, flushing of large number of animals into the water is not expected. In addition, proposed mitigation and monitoring measures would further minimize the startle behavior of pinnipeds and prevent the animals from flushing into the water.

4.1.2.3.Estimated Take of Marine Mammals by Level B Incidental Harassment

As discussed above, in-water pile removal and pile driving (vibratory and impact) generate loud noises that could potentially harass marine mammals in the vicinity of CALTRANS's proposed Murray Street Bridge seismic retrofit project.

Currently NMFS uses 120 dB re 1 µPa and 160 dB re 1 µPa at the received levels for the onset of Level B harassment from non-impulse (vibratory pile driving and removal) and impulse sources (impact pile driving) underwater, respectively. Table 5 summarizes the current NMFS marine mammal take criteria.

Table 5. Current Acoustic Exposure Criteria for Non-explosive Sound Underwater

Criterion	Criterion Definition	Threshold
Level A Harassment (Injury)	Permanent Threshold Shift (PTS) (Any level above that which is known to cause TTS)	180 dB re 1 µPa (cetaceans) 190 dB re 1 µPa (pinnipeds) root mean square (rms)
Level B Harassment	Behavioral Disruption (for impulse noises)	160 dB re 1 µPa (rms)
Level B Harassment	Behavioral Disruption (for non-impulse noise)	120 dB re 1 µPa (rms)

Numbers of marine mammals that could be incidentally harassed are calculated by estimating the maximum number of marine mammal being present within a ZOI during active pile driving based on estimates of numbers of animals identified during the marine mammal surveys. Numbers of residential harbor seals are expected to be at a maximum during the season in which surveys were conducted (outside of breeding and molting seasons).

Pile driving (in-water and on-land) estimates are based on the maximum number of days that pile driving could potentially occur (installation of 42 permanent bridge; installation and removal of 120 temporary piles to support a construction trestle, if used; removal and reinstallation 35 boat

berth piles, and removal of 4 existing bridge piles. In total, up to 49 days of pile driving and 15.5 days of pile removal are anticipated.

For the exposure estimate, it is conservatively assumed that the highest count of sea lions, harbor seals, and sea otters observed will be foraging within the ZOI and be exposed multiple times during the Project.

The calculation for marine mammal exposures is estimated by:

> Exposure estimate = N (number of animals in the area) * Number of days of pile removal/driving activity

Estimates include Level B acoustical harassment during impact and vibratory pile driving and vibratory pile removal. All estimates are conservative, as pile removal/driving would not be continuous during the work day. Using this approach, a summary of estimated takes of marine mammals incidental to CALTRANS's Murray Street Bridge seismic retrofit project are provided in Table 6.

Table 6. Estimated numbers of marine mammals that may be exposed to Level B behavioral harassment

Species	Estimated marine mammal takes	Abundance	Percentage
Pacific harbor seal	710	30,968	2.29%
California sea lion	968	296,750	0.32%

4.2. Effects of Alternative 2 – No Action Alternative

Under the No Action Alternative, we would not issue an IHA to CALTRANS. As a result, CALTRANS would not receive an exemption from the MMPA prohibitions against the take of marine mammals and would be in violation of the MMPA if they proceeded with their project and take of marine mammals occurred. If the project is not conducted, the "No Action" alternative would result in no disturbance to marine mammals.

4.3. Compliance with Necessary Laws – Necessary Federal Permits

We have determined that the issuance of an IHA is consistent with the applicable requirements of the MMPA, MSFMCA, and our regulations. Please refer to Section 1.4 of this EA for more information.

4.4. Unavoidable Adverse Impacts

CALTRANS's application and the other environmental analyses identified previously (CALTRANS 2010b) summarize unavoidable adverse impacts to marine mammals or to their populations to which they belong or on their habitats occurring in the proposed project area. We incorporated those documents by reference to include potential effects on other species.

We acknowledge that the incidental take authorized would potentially result in unavoidable adverse impacts to individual animals that would be harassed as a result of the Project. However, we do not expect CALTRANS's activities to have adverse consequences on the viability of marine mammals in the Santa Cruz Harbor, and we do not expect the marine mammal populations in that area to experience reductions in reproduction, numbers, or distribution that might appreciably reduce their likelihood of surviving in the wild. We expect that the numbers of individuals of all species taken by harassment would be small (relative to species or stock abundance) and that the proposed Murray Street Bridge seismic retrofit project and the take resulting from the proposed project activities would have a negligible impact on the affected species or stocks of marine mammals.

The MMPA requirement of ensuring the proposed action has no unmitigable adverse impact to subsistence uses does not apply here because there are no permitted subsistence uses of marine mammals in the region.

4.5. Cumulative Effects

NEPA defines cumulative effects as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR §1508.7). Cumulative impacts can result from individually minor but collectively significant actions that take place over a period of time.

Past, present, and foreseeable impacts to marine mammal populations include the following: commercial whaling; climate change affecting the prey base and habitat quality as a result of global warming; ship strikes; fishing gear entanglement; exposure to biotoxins and the resulting bioburden; acoustic masking from anthropogenic noise; competition with commercial fisheries; and killer whale predation. These activities account for cumulative impacts to regional and worldwide populations of marine mammals, many of whom are a small fraction of their former abundance. However, quantifying the biological costs for marine mammals within an ecological framework is a critical missing link to our assessment of cumulative impacts in the marine environment and assessing cumulative effects on marine mammals (Clark *et al.*, 2009). Despite these regional and global anthropogenic and natural pressures, available trend information indicates that most local populations of marine mammals in the Pacific Ocean are stable or increasing (Carretta *et al.*, 2015).

The proposed construction project would add another, albeit localized and temporary, activity in California coast. This activity would be limited to a small area in the Santa Cruz Harbor for a relatively short period of time. This section provides a brief summary of the human-related activities affecting the marine mammal species in the action area.

4.5.1. Coastal Development

Beside the proposed Murray Street Bridge seismic retrofit project, a variety of other harbor maintenance and repair work are routinely performed at the Santa Cruz Harbor. Owning to its urban environment at the Harbor, harbor seals and California sea lions are habituated to a variety of human activities in the area. Therefore, CALTRANS' proposed construction work at the Murray Street Bridge is not expected to have significant impacts to the overall region environment as the activities involved are brief, localized, and of small scales.

4.5.2. Marine Pollution

Marine mammals are exposed to contaminants via the food they consume, the water in which they swim, and the air they breathe. Point and non-point source pollutants from coastal runoff, offshore mineral and gravel mining, at-sea disposal of dredged materials and sewage effluent, marine debris, and organic compounds from aquaculture are all lasting threats to marine mammals in the project area. The long-term impacts of these pollutants, however, are difficult to measure.

The persistent organic pollutants (POPs) tend to bioaccumulate through the food chain; therefore, the chronic exposure of POPs in the environment is perhaps of the most concern to high trophic level predators such as California sea lions and Pacific harbor seals.

The CALTRANS's construction and demolition activities associated with the Murray Street Bridge seismic retrofit project are not expected to cause increased exposure of POPs to marine mammals in the project vicinity due to the small scale and localized nature of the activities. Additionally, the CALTRANS would use barges to carry out all construction debris and demolition material for proper disposal.

4.5.3. Disease

Disease is common in many marine mammal populations and has been responsible for major die-offs worldwide, but such events are usually relatively short-lived.

Since 2014, researchers have detected large blooms of toxin-producing algae in Monterey Bay, raising concerns about potential effects on marine mammals and seabirds. The bloom involves microscopic algae called *Pseudo-nitzschia* (a type of diatom), which produce a potent neurotoxin called domoic acid. The toxin was first detected in early May 2014, and by the end of the month researchers had detected some of the highest concentrations of domoic acid ever observed in Monterey Bay. During large blooms, the toxin accumulates in shellfish and small fish such as anchovies and sardines that feed on algae, causing birds and sea lions to become disorientated and exhibit seizures when they ate the toxic fish. However, CALTRANS proposed Murray Street Bridge construction work would not contribute to marine mammal disease since no pathogens would be introduced into the water as a result of the project.

4.5.4. Commercial and Private Marine Mammal Watching

Although marine mammal watching is considered by many to be a non-consumptive use of marine mammals with economic, recreational, educational and scientific benefits, it is not without potential negative impacts. One concern is that animals may become more vulnerable to vessel strikes once they habituate to vessel traffic (Swingle *et al.* 1993; Laist *et al*. 2001; Jensen and Silber 2004; Douglas *et al.* 2008). Another concern is that preferred habitats may be abandoned if disturbance levels are too high. Several recent research efforts have monitored and evaluated the impacts of people closely approaching, swimming, touching and feeding marine mammals and has suggested that marine mammals are at risk of being disturbed ("harassed"), displaced or injured by such close interactions. Researchers investigating the adverse impacts of marine mammal viewing activities have reported boat strikes, disturbance of vital behaviors and social groups, separation of mothers and young, abandonment of resting areas, and habituation to humans (Nowacek *et al.* 2001).

There are no known marine mammal watching operations based in the vicinity of the proposed action area. Marine mammal watching operations, however, especially whale watching operations, are common in the nearby Monterey Bay area, and thus marine mammals that occur in both the action area and the Monterey Bay area could be adversely affected by such marine mammal watching operations over time. However, the proposed CALTRANS's Murray Street Bridge construction work is not like to add additional cumulative adverse effects due to its small spatial scale and brief duration.

4.5.5. Boating

The Santa Cruz Harbor is home to many boats in the City of Santa Cruz. The Harbor accommodates 920 boat berths that support both commercial and recreational boating activities (CALTRANS 2010a). In the immediate project vicinity, the Santa Cruz Rowing Club boat storage and University of California Santa Cruz rowing berth facility are located underneath the bridge and immediately south of bridge, respectively, on the west side of the Harbor. There are two waterway openings beneath the bridge through which all boats berthed in the northern portion of the harbor must pass. These two openings are required for efficient operations in the harbor. While long-term studies are needed to better understand the impact of vessel traffic on marine mammals like whales, short-term research has already begun and findings suggest that boat noise directly affects the behavior of marine mammals. Increased boat traffic not only has the potential to increase the likelihood of ship strike of marine mammals, it also contributes to increased ambient noise level. The proposed action area is mainly served by local boats that travel around the vicinity of Monterey Bay. There is no increase in boating activities and number in the foreseeable future.

4.5.6. Commercial Fishing

Commercial fisheries may affect marine mammals indirectly by altering the quality of their habitat. The removal of large numbers of fish (both target and non-target or bycatch species) from a marine ecosystem can change the composition of the fish community, altering the abundance and distribution of prey available for marine mammals. In addition, by removing large amounts of biomass, commercial fisheries compete with other consumers that depend on the target species for food, which can, in turn, increase competition between different piscivorous predators. Nevertheless, the proposed action area is a city harbor where no fishing activity is occurring. The proposed Murray Street Bridge seismic retrofit project would not change the current status quo of commercial fisheries in the Puget Sound area.

4.5.7. Climate Change

Global climate change could significantly affect the marine resources of the Northwest Pacific region. Possible impacts include temperature and rainfall changes and potentially rising sea levels and changes to ocean conditions. These changes may affect the coastal marine ecosystem in the proposed action area by increasing the vertical stratification of the water column and changing the intensity and rhythms of coastal winds and upwelling. Such modifications could cause ecosystem regime shifts as the productivity of the regional ecosystem undergoes various changes related to nutrients input and coastal ocean process (FWS 2011).

The precise effects of global climate change on the action area, however, cannot be predicted at this time because the coastal marine ecosystem is highly variable in its spatial and temporal scales.

4.5.8. Summary of Cumulative Effects

Although commercial harvest no longer takes place, whale watching, coastal construction and development, marine pollution, and disease continue to result in some level of impact to marine mammal populations in the area. Nonetheless, the proposed construction work at the Murray Street Bridge in Santa Cruz would only add negligible additional impacts to marine mammals in the project area due to the limited project footprint within the action area.

The pile driving and pile removal activities associated with the Murray Street Bridge seismic retrofit project are well planned to minimize impacts to the biological and physical environment of the areas by implementing mitigation and monitoring protocols. Therefore, NMFS has determined that the CALTRANS's Murray Street Bridge seismic retrofit project would not have a significant cumulative effect on the human environment, provided that the mitigation and monitoring measures described in Sections 2.3.4 and 2.3.5 are implemented.

Chapter 5 List of Preparers and Agencies Consulted

Agencies Consulted

No other persons or agencies were consulted in preparation of this EA.

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